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ABSTRACT

The resource guide consists of learning activities in earth science for students at the level of junior high school. The subject matter is divided into three major topics--astronomy, the earth, and earth's weather--which are subdivided into major divisions. The major divisions are provided with suggested learning activities. Career-related activities, referenced to the occupational categories to which they apply, are also included. also included is a listing of careers related to earth science areas. A check list is provided in the career evaluation guide from which any job can be appraised in terms of the more important considerations in evaluating a potential area. Appended is a listing of books, periodicals, films and other aids which have been categorized as curriculum or career-related references. Also within the appendix is a listing of all the materials on the Louisiana State adopted list of textual materials. (Author/NJ)

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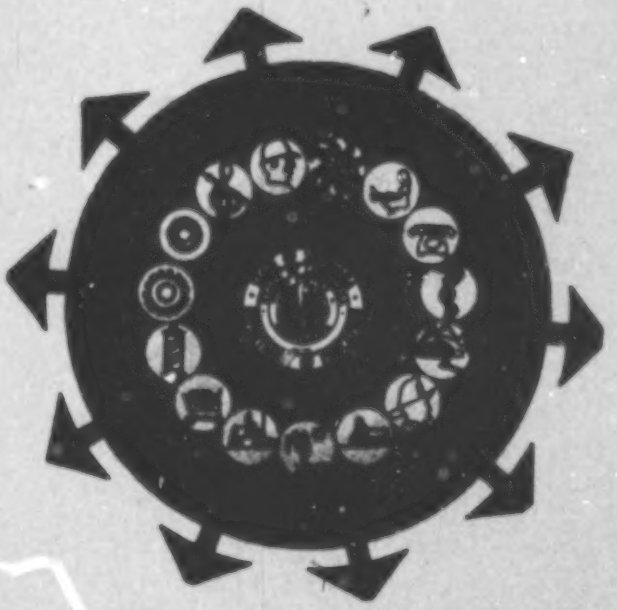

CAREER EDUCATION GUIDE FOR EARTH SCIENCE

7—9

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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1974
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STATE SUPERINTENDENT OF EDUCATION

ACKNOWLEDGMENT

Public attention has been focused on Career Education as a means of strengthening our present academic curriculum in Louisiana. With increased concentration in the area of vocational education, recognition of the need for comprehensive guides became apparent. To insure that a continuous progress program with emphasis on individualized instruction would be developed, a group of classroom teachers, counselors, and administrators was selected to produce guides for the dedicated science teachers of Louisiana.

Much credit is due all those individuals and agencies who pioneered in the development of the Curriculum and Career Education Guides in Science.

VT 102464

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INTRODUCTION

Many Earth Science texts, materials and programs exist which are available for use by teachers in establishing basic programs and for purposes of enrichment. This guide was written with full knowledge that it must be applicable for use with any of these available programs, and should integrate well with any methodology the teacher might choose to use.

This publication is designed to offer suggestions to instructors regarding possible scope and sequence, to provide a nucleus of activities whose use should result in an ever-expanding repertoire of curriculum and career-related activities.

Under no circumstances should this document be considered to be prescriptive, rather it is suggestive and should be constantly expanded upon by the teacher and revised to meet the specific needs of the teacher and students in their particular community.

HOW TO USE THIS RESOURCE MANUAL

This guide is designed to be used as a suggestive reference for teachers teaching Earth Science as a course or to be drawn on as appropriate for earth science units or topics within a general science course.

The guide begins by introducing the teacher to a variety of career-related topics which in some cases are related in a general way to grade level. There is included a listing of careers related to earth science areas which can serve as a springboard of ideas and to which can be added by student action a variety of new careers and job titles.

Suggestions for Teaching-Learning Activities are offered as a stimulus for the development of methods for presenting career ideas and concepts and for subject-matter instruction.

It should be remembered that a "6-pak" of career and counseling activities areas exist from which teaching and learning activities can be drawn. The "6-pak" of activity areas are:

1. Subject-Matter Related Activities
2. Field Trips
3. Resource Persons
4. "Hands-On" Activities
5. Occupational Activities
6. Role Playing

This guide has attempted to provide examples of each of these areas in its suggestions.

A check list of things to do and look for are provided in the Career Evaluation Guide from which any job or occupation can be appraised in terms of the more important considerations one should make when evaluating a potential area.

Listings of the various career opportunities are found in the section entitled Career Clusters which is followed by a section entitled Occupational Categories. The Occupational Categories were formed by collapsing the fifteen clusters into 5 broad areas on job categories listed below:

1. Manual Skills
2. Agriculture and Forestry Related Occupations
3. Service Related Occupations
4. Business Related Occupations
5. Technical and Professional Occupations

The heart of the guide consists of the units of Earth Science. The subject-matter is divided into 3 major topics. 1. Astronomy, 2. The Earth, and 3. Earth's Weather. Each of these topics is then subdivided in major divisions within which are listed the major concepts to be taught. It should be noted that these concepts are generally stated in non-technical language, much as we would like for our students to state them 3 years after completing the course.

The major divisions of the topics are provided with suggested student activities. To do all of these activities, in most cases, would be unreasonable. They are provided as examples of activities which could be done to help students master the subject-matter and become aware of, at least, the career opportunities which exist relative to that subject-matter. As a further aid career-related activities are referenced to the occupational categories which might apply.

In the appendix there is provided a reference listing of books, periodicals, films and other aids. These have been categorized as curriculum on career-related references for the convenience of the user. Also, within the appendix there is a listing of all of the materials on the state adopted list of textual materials at the time of publication.

CAREER CONCEPTS AND OBJECTIVES: A SEQUENTIAL PLAN

GRADE

I. CAREER AWARENESS: Recognition of the Adult World of Work--Early Awareness of Careers is the Prelude to Future Achievement (K-3)

1. The individual is the born resource of society
2. Individuals have many kinds of careers
3. Meaningful, rewarding careers are available to every individual

II. CAREER MOTIVATION: Increasing interest in future world of work in relation to the individual and to society (2-6)

4. Work is basic to human development
5. Occupations contribute to society's progress
6. Careers require different knowledge, abilities, attitudes and talents
7. Individuals have different abilities, interests, needs and values
8. Individuals seek careers for varied reasons

Continue:

3. Meaningful, rewarding careers are available to every individual

III. CAREER EXPLORATION: Relating self to needs (5-9)

9. Environmental variability creates variable opportunity
10. Careers can be grouped into clusters
11. Different careers are interrelated
12. Every career requires some special preparation and a plan of special preparation facilitates this

Continue:

7. Individuals have different abilities, interests, needs and values
8. Individuals seek careers for varied reasons

GRADE

IV. TENTATIVE CAREER DECISIONS AND EXPLORATION: (8-10)
Focusing career options on a few realistic possibilities

13. Individual careers may change as individuals change throughout life
14. Individuals may be suited for several different careers
15. Individuals adapt to world changes and environment
16. World changes, conditions and environment affect careers

Continue:

7. Individuals have different abilities, interests, needs and values
8. Individuals seek careers for varied reasons
10. Careers can be grouped into clusters
11. Different careers are interrelated
12. Every career requires some special preparation and a plan of special preparation facilitates this

V. ACQUISITION OF CAREER ENTRY SKILLS AND CONTINUED EXPLORATION: (9-12)
Acquiring skills; habits and attitudes leading to competence

17. Careers require different levels of competence in communication, computation and analysis
18. Careers have different levels of competence and responsibility
19. Rules, regulations, policies and procedures affect individuals in all careers
20. Careers are affected by the ability of individuals to relate to each other

Continue:

13. Individual careers may change as individuals change throughout life
14. Individuals may be suited for several different careers
15. Individuals adapt to world changes and environment

SOME CAREERS RELATED TO INTEREST AND ABILITY IN EARTH SCIENCE

Agriculturist
Agronomist
Astronomer
Aviator

Biologist (Fresh Water)
Biologist (Marine)
Brick Mason

Chemist

Dairyman
Driller
Dredger
Diver

Ecologist
Economist
Entomologist

Fisherman (Commercial)
Forester

Geologist
Geographer
Gemologist

Laborer

Mathematician
Meteorologist
Miner

Navigator

Oceanographer (Chemical)
Oceanographer (Geological)
Oceanographer (Physical)
Oysterman (Commercial)
Oil Field Worker

Paleontologist
Park Guide
Professor (Geology)
Professor (Meteorology)
Professor (Physics)

Shrimper (Commercial)
Shipbuilder

Teacher
Technician

SUGGESTIONS FOR TEACHING-LEARNING ACTIVITIES

Below are listed ideas which might be helpful in planning for varied types of teaching-learning situations:

1. Interviews
2. Skits
3. Theme writing
4. Bulletin Board
5. Debates
6. General discussion
7. Small group discussion
8. Committee work
9. Individual or group study
10. Oral reports
11. Newspaper articles
12. Field trips
13. Movies
14. Filmstrips
15. Slides
16. Overhead or opaque projections
17. Collect want ads
18. Write want ads
19. Employment Commission job lists
20. Exhibits
21. Collect materials
22. Observations
23. Role playing
24. Resource person
25. Brainstorming
26. Games
27. Research projects
28. Demonstrations
29. Prepare lists
30. Radio and television programs
31. Projects
32. Illustrations
33. Chalktalks
34. Panel discussions
35. Make files
36. Tests
37. Problem solving
38. Prepare charts and graphs
39. Window displays
40. Write letters
41. Assigned reading
42. Thought problems
43. Prepare speeches
44. Notebooks
45. Lecture

(From Introduction to Vocations, Teacher's Guide, Course Number 799, July, 1965, prepared by H. E. Beam and J. R. Clary, North Carolina)

*CAREER EVALUATION GUIDE

1. Physical Working Environment
   A. Where is the work done?
   B. Is the work hazardous?
   C. Will I work alone or with a group?
   D. Will I be expected to attend social functions?
   E. What mode of dress or appearance is required for the job?
   F. Is the work seasonal?
   G. How many people are employed in this occupation? (As of now and through the '70's)
   H. Is the number of people employed different than it was ten or twenty years ago?
   I. How many hours per week will I work?

2. The Steps of Promotion
   A. Title of the occupation
   B. Educational requirements for promotion
   C. Practical experience needed
   D. Personal qualifications needed
   E. Duties of the job to which promoted

3. In what way will I enter this work?
   A. Is previous experience needed?
   B. Apprenticeship?
   C. Internship?
   D. Others?

4. Educational Requirements for Promotion

5. What is the approximate cost of preparing for entry into this occupation?

6. What is the approximate cost of any additional education or training which I might need?

7. Salary Range

8. Avenues from which funds for additional education may be secured
   A. Student loans
   B. Student stipends
   C. Scholarships
   D. Company stipends

*"Careers Related to Science" - V.I.E.W.
Vital Career Information Center
State Department of Education

A. The Agri-Business and Natural Resources cluster includes:

Operations
Support and regulations
Research
Forestry
Land and water management
Fisheries and Wildlife
Mining and quarrying
Petroleum and related products
Service
Production
Processing and marketing

B. The cluster for communication and media includes:

Operations
Line communications
Broadcasting
Audio-Visual
Language
Publishing

C. The construction cluster includes:

Operations
Design
Contracting
Interior
Landscaping
Land development
Fabrication and installation

D. The Consumer and Homemaking (related occupations) cluster includes:

Operations
Food service industry

Clothing, apparel and textile industry
Child care, guidance and teaching
Family and community services
Institutional household maintenance services
Interchangeable technician for homemaking
Housing design and interior decoration

E. Included in the cluster for Environment are:

Operations
Soil and mineral conservation and control
Space and atmospheric monitoring and control
Environmental health services
Development and control of physical man-made environment
Forest, range, shore and wildlife conservation and control
Water resource development, conservation and control

F. The cluster for Fine Arts and Humanities includes:

Operations
Fine Arts
Humanities

G. The Health Occupations cluster includes:

Operations
Health information systems
Health services delivery
Mental health, mental illness and retardation
Accidents, injuries and emergency services
Dental Science and Services
Pharmaceutical science and services

H. The Manufacturing cluster includes:

Operations
Design
Materials
Production
Distribution
Research

I. Included in the cluster of Marine Sciences Occupations are:

Operations
Marine Biology
Commercial fishing
Aquaculture
Marine (oceanographic) exploration
Underwater construction and salvage

J. The Marketing and Distribution Occupations cluster includes:

Operations
Marketing system
Sales and Services
Buying
Sales Promotion
Physical distribution
Marketing services

K. The cluster for Personal Services Occupations includes:

Operations
Physical culture
Cosmetology
Mortuary science
Barbering
Household pet services

L. Within the Public Service cluster are:

Operations
Financial
Urban development
Regulatory services
Education
Police and fire
Defense
Post Office
Public utilities
Public health
Labor affairs
Highways
Public transportation

Social and rehabilitation
Courts and corrections
Parks and recreation

M. The cluster for Recreation, Hospitality and Tourism includes:

Operations
Environmental management
Community services
Human development
Mobility
Health care

N. The cluster for Business and Office Occupations includes:

Operations
Record Systems and Control
Secretarial
Clerical
Administrative
Business Ownership

O. The final cluster to be considered, Transportation, includes:

Operations
Aerospace transportation
Pipeline transmission
Water transportation
Land transportation

OCCUPATIONAL CATEGORIES

For purposes of convenience the fifteen occupational clusters have been grouped into 5 categories as indicated below.

The guide refers to these categories for purposes of general reference. If the need exists, the teacher need only return to this page for reference to a specific job cluster.

JOB CLUSTERS

Manual Skills - Related Occupations

1. UNSKILLED OCCUPATIONS. Occupations that involve the manual performance of simple duties that may be quickly learned and require little experience are included in this group. Such occupations require exercise of little or no independent judgment on the part of the worker. Examples are: laborers of all kinds, carpet cutters, lumbermen, some kinds of assemblers, checkers, deckhands, brakemen, stevedores.

2. SEMI-SKILLED OCCUPATIONS. Occupations that require the worker to have manipulative ability (hand and finger dexterity) of a fairly high order, to be alert, to perform a single skill of a relatively small number of operations on a product or a machine are found in this group. Examples are: pumpmen, furnacemen, smelters, inspectors, punch-press operators, foregemen, welders, log cutters, boilermakers, truck drivers, rivet catchers, lathe operators.

3. SKILLED OCCUPATIONS. These occupations require a thorough technical knowledge of processes involved in the work, the exercise of considerable independent judgment, and usually the need for a high degree of manual dexterity. Workers become qualified by taking apprenticeships or by completing extensive training periods. Examples are: tool and die makers, bakers, weavers, milliners,cabinetmakers, upholsterers, dressmakers, photo engravers, lithographers, pressmen, jewelers, watchmakers, machinists, tinsmiths, maintenance men, mechanics, electricians, carpenters, auto mechanics, aircraft mechanics.

Agriculture and Forestry - Related Occupations

4. FORESTRY OCCUPATIONS. Occupations in this area are concerned with the development and care of forests and the growing and gathering of forest products. Examples are: foresters, hunters, gamekeepers, guides, trappers.

5. FISHERY OCCUPATIONS. In this area are workers who earn their living by catching or gathering a variety of types of seafood, shells, and sea plants in one or more ways. Examples are: fishermen, oystermen, sponge, moss, and seaweed gatherers.

6. AGRICULTURAL, HORTICULTURAL, AND KINDRED OCCUPATIONS. These occupations are directly associated with the processes of growing and harvesting vegetables, fruits, grains, and other farm crops; the raising of poultry, livestock, and other animals are in this area. Examples are: dairy farmers, fruit farmers, crop farmers, livestock farmers, truck farmers, farmhands, farm mechanics, farm managers, farm foremen, gardeners.

Service - Related Occupations

7. BUILDING SERVICE WORKERS AND PORTERS. A number of occupations that are concerned with cleaning the interiors and equipment of buildings, offices, stores, and similar places, and with moving or carrying equipment, baggage,and other articles are included in this category. Examples are: janitors, porters, elevator operators, charwomen, and cleaners.

8. PROTECTIVE SERVICE OCCUPATIONS. Occupations that are concerned with the protection or guarding of the country, buildings, and other property or individuals are included in this category. Examples are: policemen, detectives, soldiers, sailors, firemen, sheriffs, guards, bridgetenders.

9. PERSONAL SERVICE OCCUPATIONS. Workers in these occupations perform services for persons. Such services usually require direct contact or close association with the individual. Examples are: barbers, waiters, shoeshiners, practical nurses, doormen, ushers, kitchen workers in restaurants and hotels, bellmen, stewards, housekeepers (hotels and restaurants), chefs, hairdressers.

10. DOMESTIC-SERVICE OCCUPATIONS. Workers in this area are involved in the maintenance of households, the cooking of meals, the care of children in private homes, and the like. Examples are: day workers, housekeepers, domestic cooks, maids, private family servants.

Business - Related Occupations

11. SALES AND KINDRED OCCUPATIONS. Typical workers in these occupations sell commodities, investments, real estate, and services. Examples are: salesmen (stocks and bonds, insurance, etc.), demonstrators, auctioneers, sales clerks (wearing apparel, household equipment, etc.), newsboys.

12. CLERICAL AND KINDRED OCCUPATIONS. Occupations in this area are concerned with the preparation, transcribing, transferring, systematizing, or preserving of written communications and records in shops or offices. Examples are: bookkeepers, office clerks, hotel clerks, file clerks, office-machine operators, post-office clerks, mail carriers, secretaries, typists, telephone operators.

13. MANAGERIAL AND OFFICIAL OCCUPATIONS. This category includes occupations that deal with policy-making, planning, supervising, coordinating, or guiding the work activity of others, usually through intermediate supervisors. Examples are: executive secretaries, treasurers, hotel managers, department-store buyers, advertising agents, ship captains, purchasing agents, factory managers, department superintendents.

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Technical and Professional Occupations

14. SEMI-PROFESSIONAL OCCUPATIONS. Included here are occupations involving theoretical or practical aspects of fields of endeavor. They require rather extensive education or practical experience, or a combination of both. Many are concerned with the technical or mechanical details of a more theoretical field of work. Examples are: chiropodist, tree surgeon, draftsmen, aviators, laboratory technicians, designers, photographers, embalmers, commercial artists.

15. PROFESSIONAL OCCUPATIONS. Occupations in this area require a high degree of mental activities. They are concerned with the theoretical or practical aspects of complex fields of human endeavor. Most occupations in this area require rather extensive education. Examples are: doctors, dentists, nurses, engineers, chemists, astronomers, editors, musicians, lawyers, architects, librarians, teachers, pharmacists.

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CONCEPTS	SUGGESTED STUDENT ACTIVITIES	RELATIONSHIP OF ACTIVITY TO OCCUPATIONAL CATEGORIES
1. ASTRONOMY		
A. Time 1. Time is continuous, orderly and rhythmic. 2. All units of time are arbitrarily chosen and defined by man, however ultimate is the speed of light. 3. The second, minute, hour and year are based on the rotation of the earth. 4. Special units of time are chosen for special purposes. 5. Calendars have been in existence for thousands of years. 6. Calendars measure time passage. 7. All calendars are inaccurate. 8. There are many different kinds of calendars. 9. Time zones are man made creations. 10. There are 24 time zones with 4 in the continental United States.	1. Develop a series of wall charts describing the history of man's development of units of time and the reasons for these units. 2. Have students devise a variety of methods for telling time, excluding all modern watches, clocks, etc. (Any rhythmic, countable system will work, such as a pendulum swinging.) 3. Give reports on Stonehedge, the Julian and Gregorian calendars, etc. 4. Develop a world map showing the time zones. 5. Develop a list of careers which directly involves time, such as watch repairman, timekeeper, and race car driver. 6. Ask a jeweler to visit the class and use models to describe how a clock works and the jewelry business as a career opportunity.	Manual Skills 5 Agriculture and Forestry Related Service Related 5,6 Business Related 5,6 Technical and Professional

CONCEPTS	SUGGESTED STUDENT ACTIVITIES	RELATIONSHIP OF ACTIVITY TO OCCUPATIONAL CATEGORIES
. ASTRONOMY (Cont'd)		
B. Space 1. Distance in space is measured in units of time, the light year. 2. The limits of space are vast and exceed 3 billion light years, but the real limits are unknown. 3. Stars vary in size and brightness. 4. Our galaxy, the milky way, is but one of millions of galaxies. 5. A galaxy is a system of stars and nebulae. 6. The universe is apparently in the process of expanding, indicating that it may have originated from a compact mass. 7. The energy of stars is from nuclear reactions. 8. Star color is an indication of age and temperature or direction of travel. 9. Constellations are groups of stars which form permanent patterns. 10. Constellations are important only for describing where an object is located in the sky. 11. Modern technology is helping astronomers answer heretofore unanswered questions.	1. Use the scale of 1 inch=1 million miles and choose objects of the correct size to represent the sun, earth, the moon, Jupiter and Pluto. Place these objects at the proper distance from the sun. 2. Using the same scale, calculate the distance from the sun to Proxima Centouri. 3. Demonstrate, using a flashlight flashed onto a cardboard sheet in a darkened room, the effects of the universe square law on brillance. Supplement this with chalkboard line diagrams explaining the phenomenon. 4. Develop wall charts of the constellations locating the position of those currently visible during the early evening. 5. Demonstrate the use of star maps. 6. Make a list of the astronomical instruments which have become available during the 20th Century. 7. Make a list of occupations in which persons actually use stars in one way or another, such as navigators, park guides and physicists. 8. Determine the educational requirements for each of the careers indicated on the list made in 7 above.	Manual Skills Agriculture and Forestry Related Service Related 7,8 Business Related Technical and Professional 7,8

CONCEPTS	SUGGESTED STUDENT ACTIVITIES	RELATIONSHIP OF ACTIVITY TO OCCUPATIONAL CATEGORIES
ASTRONOMY (Cont'd)		
C. The Solar System 1. The sun, a star, is the center of the solar system. 2. The planets orbit the sun. 3. The planets orbits are nearly in the same place, therefore, the solar system is more disk-shaped than spherical. 4. All planets move in the same direction. 5. All planet and satellite movement is in response to gravity. 6. Planets move in elliptical orbits. 7. The speed of a planet within its orbit varies. 8. The planets are very different in terms of dimensions, surface conditions, internal conditions and atmosphere. 9. Earth is probably the only planet in the solar system with higher life forms. Mars may have some simple form of vegetation on it. 10. Some of the planets possess satellites (moons). 11. Some comets are permanent parts of the solar system; others merely pass through the solar system. 12. The moon and the sun's gravitational pull result in tides on earth. 13. Interaction of the moon's pull with the sun's pull result in varying influences on ocean tides. 14. The relative position of one heavenly body relative to others influences earth's weather, causes seasons and may result in eclipses. 15. Several theories regarding the origin of the solar system exist, none of which are acceptable by all scientists.	1. Construct models of the solar system. 2. Construct and display a solar system mobile. 3. Distinguish between an eclipse and a circle. 4. Show how the universe square law (gravity) influences planet speed in its elliptical orbit. 5. Develop a wall chart contrasting the movement and structure of meteors, asteroids, and comets. 6. Develop a wall chart comparing the features of each of the planets. 7. Develop a bulletin board depicting the origin of the solar system. 8. Obtain from NASA an astronauts training schedule and qualifications for becoming an astronaut. Post these. 9. Most astronauts are armed services pilots. Ask the local army, air force and navy recruiters to get qualifications for flight training school for each branch of the armed services. Post these. 10. Write one or more commercial airlines for qualifications and employment criteria for their pilots. Post these. 11. Construct a chart comparing age, training, health and educational requirements, income and other advantages of being a commercial or service pilot. 12. Pilots require the services of ground personnel. Find out what employment opportunities and incomes are in the area of ground support in commercial and armed forces aviation.	Manual Skills 12 Agriculture and Forestry Related Service Related 12 Business Related Technical and Professional 9,10,11,12

CONCEPTS	SUGGESTED STUDENT ACTIVITIES	RELATIONSHIP OF ACTIVITY TO OCCUPATIONAL CATEGORIES
. ASTRONOMY (Cont'd) D. Space Science 1. Rockets are presently the space vehicle. 2. Rockets are governed by the physical laws of motion. 3. Rockets are classified in several ways, one way being by the kind of fuel it consumes. 4. Escape velocity decreases with altitude. 5. Rockets produce g-forces with changes in velocity or direction. 6. Satellites depend on centrifugal force to counteract gravity. 7. Man must transport his environment into space. 8. Research in space science produces many new products useful in non-space related activities.	1. Develop a bulletin board on the advantages and disadvantages of orbiting satellites. 2. Perform a service of laboratory exercises on Newton's Laws of Motion. 3. Develop a service of wall charts, demonstrations, etc., on the influence of Newton's Laws of Motion on rockets. 4. Make a list of career opportunities which are space related, but which are not restricted to space exploration, such as systems engineers.	Manual Skills 4 Agriculture and Forestry Related 4 Service Related 4 Business Related 4 Technical and Professional 4

CONCEPTS	SUGGESTED STUDENT ACTIVITIES	RELATIONSHIP OF ACTIVITY TO OCCUPATIONAL CATEGORIES
EARTH **A. Physical Geology** 1. All rocks are composed of minerals. 2. All minerals are inorganic chemical compounds. 3. Each mineral has specific properties. 4. All rocks belong to one of three groups. 5. The groups of rocks are based on method of formation. 6. The earth's crust is constantly changing due to the action of constructive and destructive forces. 7. Theories are used to explain rock movement. 8. Earthquakes are one source of information on which to base theories regarding rock movement and forces within the earth. 9. The earth's interior is part solid and part liquid. 10. Volcanoes result from internal forces. 11. Several kinds of volcanoes exist. 12. Volcanoes are one means by which matter from the earth's interior is brought to the surface. 13. Some islands are formed by volcanoes.	1. Make a collection of rocks and place these in appropriate groups. 2. Use classification keys and guides to identify rocks. 3. Make and use a rock tumbler to polish a variety of locally available rocks. 4. Ask a member of the local lapidary club to visit the class and talk about rock collecting as a hobby. 5. Make a bulletin board of the destructive and constructive forces acting in the earth. 6. Ask a geologist to visit the class and discuss topics such as mountain building, earthquakes, oil and geology, etc., as well as careers in geology, exploration for minerals, etc. 7. Make a wall chart showing a cross section of a volcano. 8. Ask a geologist or biologist to visit the class and describe the formation of atolls. 9. Make a list of possible careers and where one would be able to be trained for each career in the list, in the field of exploring for natural minerals and mining these minerals from the earth.	Manual Skills 9 Agriculture and Forestry Related Service Related Business Related 9 Technical and Professional 6,8,9

CONCEPTS	SUGGESTED STUDENT ACTIVITIES	RELATIONSHIP OF ACTIVITY TO OCCUPATIONAL CATEGORIES
I. **EARTH (Cont'd)** B. Geologic Forces and Changes 1. Formations or strata of rock are solid records of past events. 2. Normally the lower the layer of rock in a formation, the older the layer is. 3. Weathering and erosion are soil-forming processes. 4. Forces are occurring today which occurred in the past and which resulted in present geologic structures. 5. Geologic changes generally occur slowly, however, some exceptions such as earthquakes and volcanic action do occur. 6. Vast differences in the intensity of geologic forces exist. 7. Radioactive dating can be used to determine the age of some rocks and formations. 8. Radioactive substances disintegrate at a predictable rate. 9. Certain fossils can be used to determine the age of a formation.	1. Develop wall chart of geologic time. 2. Conduct a field trip to nearby areas showing stratification and possible fossilization such as some road cuts, eroded areas, nude hillsides, etc. 3. Perform a service of laboratory exercises designed to illustrate such phenomena as superposition, water, erosion, sedimentation, etc. 4. Debate such issues as: a. Selective cutting of timber is preferred to clear cutting. b. Stream channelization is desirable. c. Chemical weed control is preferred over fallow plowing or mechanical control. 5. Make a list of Federal and State Civil Service positions which are in the civil service listings and which involve working directly or indirectly with the earth; example: Soil Conservation. 6. For each job description listed above indicate the formal educational requirements. 7. Invite a paleontologist to visit the class and explain paleontology as a career. If not available, a series of reports based on library research could be one substitute. 8. A skit built around the hypothetical life of a paleontologist could be developed.	Manual Skills Agriculture and Forestry Related 5,6 Service Related 5,6 Business Related Technical and Professional 5,6,7,8

CONCEPTS	SUGGESTED STUDENT ACTIVITIES	RELATIONSHIP OF ACTIVITY TO OCCUPATIONAL CATEGORIES
I. EARTH (Cont'd)		
C. Fossils		
1. Fossils are the remains or traces of organisms which once lived.	1. Use plaster of Paris and objects such as leaves and make fossil imprints.	Manual Skills
2. The process of sedimentation is the principal means by which fossils are formed.	2. Make a class collection of animal tracks from known tracks and plaster of Paris.	Agriculture and Forestry Related
3. Fossils of life on earth today, as well as fossil evidence of mans' tools and activities are being formed today.	3. Ask a petroleum engineer or geologist to explain the significance of fossils to oil exploration.	Service Related 4
4. Most fossils are of the hard parts of organisms.	4. Most fossils and animal remains are kept in museums. Make a list of museum-related careers and the training requirements for each of the jobs included.	Business Related
5. Fossils are direct evidence of life as it existed in the past.		Technical and Professional 4
6. Generally the older a fossil is the less complex it is.		

CONCEPTS	SUGGESTED STUDENT ACTIVITIES	RELATIONSHIP OF ACTIVITY TO OCCUPATIONAL CATEGORIES
EARTH (Cont'd)		
B. Geologic Time 1. A standard Geologic Time Scale has been developed and is used worldwide as a reference system. 2. Although time can be measured in many ways, the Geologic Time Scale is based upon estimates of the time required to deposit the rocks in each period within the time scale. 3. Geologic Time is subdivided into Eras, Periods, Epochs and Ages.	1. Make written and/or oral reports on the geology of the state or local area. 2. Make special [illegible] charts and/or reports on local geologic [illegible] facts or sites of interest. 3. Make a large classroom geologic time table. 4. Show various events of local interest in relation to the time table. 5. Consult pages 316-320 of Geology and Earth Science Sourcebook for Elementary and Secondary Schools, American Geologist Institute, Holt, Rinehart and Winston, 1962, for special student problems and for unsolved problems in stratigraphy. 6. Describe the work, education and job availability of stratigraphers, geochronologists and paleogeographers.	Manual Skills Agriculture and Forestry Related Service Related Business Related Technical and Professional 6

CONCEPTS	SUGGESTED STUDENT ACTIVITIES	RELATIONSHIP OF ACTIVITY TO OCCUPATIONAL CATEGORIES
. **EARTH (Cont'd)**		
E. The Atmosphere 1. The atmosphere is an envelope of gases and water vapor which surrounds the earth. 2. The atmosphere consists of several layers. 3. Atmospheric pressure varies with altitude. 4. Earth's gravity holds the atmosphere in place. 5. Change in conditions within the atmosphere is known as weather. 6. Uneven heating and cooling of the earth causes winds. 7. Cold air moves from the poles to the equator along the earth's surface, while warm air moves from the equator to the poles above the surface. 8. Earth's rotation determines the direction of general movement of the atmosphere.	1. Make a chart and "pie graph" of the gases which comprise the atmosphere and the percent of each in the air. 2. Demonstrate how air exerts pressure by showing that air takes up space and has weight. 3. Contrast our gravity and atmosphere with that of the moon. 4. Contrast climate and weather. 5. Compare the troposphere and stratosphere. 6. Discuss and demonstrate the coriolis effect. 7. Make a diagram showing the jet stream. 8. Make a wall chart showing the influence of earth, water and temperature on air movement on the beach during the night and day. 9. Ask an employee of an air reduction plant to visit the class and demonstrate some unique effects produced by liquid air; example: a banana dipped in liquid air can be used to drive nails. 10. Develop a list of jobs which are available in the business of making and using liquid air. 11. Ask a pilot to visit the class and discuss "air careers" and aviation as a vocation and avocation.	Manual Skills 10,11 Agriculture and Forestry Related Service Related 10,11 Business Related 10,11 Technical and Professional 10,11

CONCEPTS	SUGGESTED STUDENT ACTIVITIES	RELATIONSHIP OF ACTIVITY TO OCCUPATIONAL CATEGORIES
EARTH (Cont'd)		
F. Oceanography (The Hydrosphere) 1. Oceanographers use all of the sciences and mathematics. 2. Most of the surface of the earth is covered by seas. 3. Sea water contains dissolved minerals. 4. Salinity is a ratio of dissolved salts to water. 5. Sea water is more dense than fresh water. 6. Pressure in liquids increases with depth and increases in density. 7. The sea floor has the same structural characteristics as does the land. 8. Forces produced by large bodies of water influence the adjacent land areas. 9. Islands may be mountains which extend above the water, small sandbars or the products of coral reefs and volcanic activity. 10. Ocean currents are similar to wind or air currents in behavior and origin. 11. Ocean currents are affected by weather and effect climate. 12. Ocean waves near shorelines possess tremendous energy and are a potential source of power. 13. Tides are predictable movements of seawater caused by the gravitational pull of the sun and moon. 14. Both plants and animals inhabit the seas. 15. All sea life is dependent upon the sun's energy.	1. Make a wall chart or bulletin board of the various oceanographic areas; example: marine biology. By each branch identify the various civil service job descriptions and the educational requirements for each job. 2. Develop and present a skit explaining the fact that oceanography is a many disciplined area with job opportunities for the salty sailor and the landlubber who never wants to go near water. 3. Contrast the life of most modern day oceanic fishermen and that of the Portuguese Dorymen. 4. In the laboratory determine the salinity of solutions on the basis of their density. 5. Have students build densitometers using test tubes, lead shot, balances and liquids of known density. 6. Have a student or group of students demonstrate the use of densitometers in business and industry. 7. Make calculations from actual and spurious data to determine wave length, period and total force of moving waves. 8. Construct wall charts about such topics as: a. Where life in the seas is most abundant b. Photosynthesis in the seas, food chains and webs in the seas 9. Develop a list of sea-related careers, including such areas as shrimp fishing, merchant marines, salvage diving, ship and boat building, etc.	Manual Skills 1,2,3,9 Agriculture and Forestry Related 1,2,9 Service Related 1,2,6,9 Business Related 1,2,3,9 Technical and Professional 1,2,6,9

CONCEPTS	SUGGESTED STUDENT ACTIVITIES	RELATIONSHIP OF ACTIVITY TO OCCUPATIONAL CATEGORIES
EARTH (Cont'd) . Oceanography (The Hydrosphere) (Cont'd) 16. Photosynthesis is the system by which the sun's energy is channeled into life in the sea, as on land. 17. Life is most abundant in the zones of the sea. 18. The sea is a source of food for man and his animals.	(See activities on preceding page)	Manual Skills 1,2,3,9 Agriculture and Forestry Related 1,2,9 Service Related 1,2,6,9 Business Related 1,2,3,9 Technical and Professional 1,2,6,9

CONCEPTS	SUGGESTED STUDENT ACTIVITIES	RELATIONSHIP OF ACTIVITY TO OCCUPATIONAL CATEGORIES
WEATHER 1. The sun is the prime force in the production of earth's weather. 2. Atmospheric pressure is affected by temperature more than any other factor. 3. Winds are deflected clockwise in the northern hemisphere and counter-clockwise in the southern hemisphere. 4. Three major wind belts exist-- the trade winds, the westerlies and the easterlies. 5. When two different air masses meet in a low pressure area, a front is formed. 6. When a front passes, temperatures change and precipitation usually results. 7. The capacity of air to hold moisture increases with increased temperature. 8. Precipitation can result if sufficient cooling of air occurs, even though no front is present. 9. Oceans have a more uniform climate than do land masses. 10. Climate is not constant, but undergoes cyclic changes of a variety of types. 11. Many factors about earth's weather are not completely understood, such as the cause of tropical hurricanes and lightning.	1. Where possible, visit a U.S. Weather Bureau office and observe the methods used in weather forecasting. 2. Invite a meterologist from a U. S. Weather Bureau office, or a military installation, to speak to the class about weather, weather forecasting and job opportunities in meterology. 3. Obtain a one-month series of daily weather maps from a nearby U. S. Weather Bureau office and examine changes which occurred. Try to establish cause for the observed changes. 4. Use daily weather maps and locate areas of frontal and nonfrontal precipitation. 5. Use daily weather maps and have teams of students compete as weather forecasters. 6. Use a hygrometer, rain gauge, wind vane, anemometer and barometer to make daily weather readings for your area. 7. Prepare a wall-sized world map and show the typical paths of tropical storms over the oceans, or a recent hurricane which moved inland onto the United States, and show the principal ocean currents. 8. Make a list of careers and the educational requirements of each job listed which are made necessary by the fact that weather changes. Include such job areas as those required to produce shelter and clothing, as well as plumbing and meterology.	Manual Skills 8 Agriculture and Forestry Related 8 Service Related 1,8 Business Related 8 Technical and Professional 1,8

APPENDIX A

CURRICULUM RELATED RESOURCES

BOOKS:

Abell, George O. Exploration of the Universe Holt, Rinehart & Winston, Inc., New York, 1964.

Adams, Frank D. The Birth and Development of the Geological Sciences. Dover Publications, Inc., New York, 1954.

Allen, William H. Dictionary of Technical Terms for Aerospace Use. NASA SP-7. Government Printing Office, Washington, 1965.

Alter, Dinsmore, Clarence H. Cleminshaw, and John G. Phillips. Pictorial Astronomy, 2nd Rev. ed. Thomas Y. Crowell Company, New York, 1963.

Amaldi, Ginestra. The Earth. Abradale Press, New York, 1966.

American Foundation for Continuing Education. Exploring the Universe. McGraw-Hill Book Company, New York, 1963.

Atwood, Wallace W. The Physiographic Provinces of North America. Ginn and Company, Boston, 1940.

Baker, Robert H. Astronomy, 7th ed. D. Van Nostrand Co., Inc. Princeton, N.J. 1959.

Baldwin, Ralph B. A Fundamental Survey of the Moon. McGraw-Hill Book Company, New York, 1965. Paperback.

Baldwin, Ralph B. The Measure of the Moon. University of Chicago Press, Chicago, 1963.

Barnett, Lincoln. The Universe and Lt. Einstein, 2nd rev. Ed. The New American Library of World Literature, Inc. Mentor Book, New York, 1957.

Bascom, Willard. A Hole in the Bottom of the Sea: The Story of the Mohole Project. Doubleday & Company, Inc., Garden City, N.Y. 1961

Bascom, Willard. Waves and Beaches: The Dynamics of the Ocean Surface. Doubleday & Company, Inc. (Anchor Book), Garden City, N.Y., 1964.

Bateman, Alan M. Formation of Mineral Deposits, John Wiley & Sons, Inc. New York, 1951.

Bates, D. R. The Earth and Its Atmosphere. Basic Books, Inc., Publishers, New York, 1960.

Biological Sciences Curriculum Study. Biological Science: Molecules to Man. BSCS Blue Version. Houghton Mifflin Company, Boston, 1973.

Biological Sciences Curriculum Study. Biological Science: An Inquiry into Life. BSCS Yellow Version. Harcourt, Brace & World, Inc., New York, 1973.

Biological Sciences Curriculum Study. High School Biology. BSCS Green Version. Rand McNally & Co., Skokie, Illinois, 1973.

Brandwein, Paul F. Sourcebook for the Physical Sciences. Harcourt, Brace and World. New York, 1961.

Buckman, Harry O. and Nyle C. Brady. The Nature and Properties of Soils, 6th ed. The Macmillan Company New York, 1960.

Carr, Archie and the Editors of Life. Reptiles, Time, Inc. (Life Nature Library), New York, 1963.

Compton, Robert R. Manual of Field Geology. John Wiley & Sons, Inc., New York, 1962.

Dunbar, Carl O. Historical Geology, 2nd ed. John Wiley & Sons, Inc., New York, 1960

Duncan, John C. Astronomy, 5th ed. Harper & Row, Publishers, New York, 1955.

Dyson, James. The World of Ice. Alfred A. Knopf, Inc., New York, 1962.

Easton, William H. Invertebrate Paleontology. Harper & Row, Publishers, New York, 1960.

Ericson, David B. and Goesta Wollin. The Deep and Past. Alfred A. Knopf, Inc., New York, 1964.

Fenneman, Nevin M. Physiography of the Western United States. McGraw-Hill Book Company, New York, 1931.

Fenton, Carroll L. and Mildred A. Fenton. Giants of Geology. Doubleday & Company, Inc. Garden City, N. Y., 1962.

Frank, Phillipp. Einstein, His Life and Times. Alfred A. Knopf, Inc., New York, 1947.

Gallant, Roy A. Exploring Mars. Doubleday & Company, Inc., Garden City, N.Y., 1956.

Gardner, Martin. Relativity for the Million. The Macmillan Company, New York, 1962.

Heller, Robert L. ed. Geology and Earth Sciences Sourcebook. Holt, Rinehart & Winston, Inc., New York, 1962.

Hill, M. N. ed. of series. The Sea. John Wiley & Sons., Inc.New York, 1963.

Hoyle, Fred. The Nature of the Universe, rev. ed. Harper & Row, Publishers, New York, 1960.

Inacopi, Robert. Earthquake Country. Lane Magazine & Book Co. (Sunset Book), Menlo Park, California. 1964.

Jacobs, J. A., R. D. Russell, and J. Tuzo Wilson. Physics and Geology. McGraw-Hill Book Company, N.Y. 1959.

Joseph, Alexander and others. Teaching High School Science: A Sourcebook for the Physical Sciences. Harcourt, Brace & World, Inc., New York, 1961.

Keller, Walter D. Principles of Chemical Weathering, rev. ed. Lucas Brothers, Columbia, Mo., 1959.

King, Philip B. The Evolution of North America. Princeton University Press, Princeton, N.J., 1959

Lahee, Fredrick H. Field Geology, 6th ed. McGraw-Hill Book Company, New York, 1961.

Leet, L. Don and Sheldon Judson. Physical Geology, 3rd ed. Prentice-Hall, Inc., Englewood Cliffs, N.J., 1965.

Matthews, William H., III. Fossils: An Introduction to Prehistoric Life. Barnes & Noble, Inc. (Everyday Handbook Series), New York, 1962.

McGraw-Hill Encyclopedia of Science and Technology McGraw-Hill Book Company, N.Y., 1960.

Ommanney, F.D., and the Editors of Life. The Fishes. Time, Inc. (Life Nature Library), New York, 1963.

Oparin, Alexander I. (Translated by S. Margolis) The Origin of Life, 2nd ed. Dover Publications, Inc., New York, 1953. Paperback

Page, Thornton, ed. Stars and Galaxies: Birth, Aging and Death in the Universe. Prentice-Hall Inc., Englewood Cliffs, N.J. 1962.

Pettersson, Hans. The Ocean Floor. Yale University Press, New Haven, Conn., 1954.

Rittmann, Alfred. Translated by E. A. Vincent. Volcanoes and Their Activity. John Wiley & Sons., Inc., New York, 1962.

Read, H.H. Geology: An Introduction to Earth History. Oxford University Press, Inc., New York, 1963.

Simpson, George Gaylord. Horses. Doubleday & Company, Inc., Garden City, N.Y., 1961.

Soil --The 1957 Yearbook of Agriculture. U. S. Department of Agriculture, Washington, D.C.

Thompson, Louis M. Soils and Soil Fertility, 2nd ed. McGraw-Hill Book Company, New York, 1957.

Weller, J. Marvin. Stratigraphic Principles and Practice. Harper & Row, Publishers, New York, 1960.

Wyatt, Stanley P. Principles of Astronomy. Allyn & Bacon, Inc., Boston, 1964.

Young, Louise B., ed. Exploring the Universe McGraw-Hill Book Company, New York, 1963.

PAMPHLETS:

Reiche, Parry. A Survey of Weathering Processes and Products. University of New Mexico Publications in Geology, Number 3, rev. ed. University of New Mexico Press, Albuquerque, 1950.

U. S. Department of Agriculture. Know Your Soil. Agriculture Information Bulletin 267, Washington, February, 1963.

U. S. Department of Agriculture. Soil and Water Conservation Activities for Boy Scouts. Program Aid 348, Washington, 1964.

PERIODICALS:

Anderson, Don L. "The Plastic Layer of the Earth's Mantle." Scientific American, July, 1962. Offprint #855.

Barnes, Virgil E. "Tektites." Scientific American, November, 1961. Offprint #802.

Collins, L. G. "Finding Rare Beauty in Common Rocks." National Geographic, January, 1966.

Dietz, Robert S. "Passive Continents, Spreading Sea Floors, and Collapsing Continental Rises." American Journal of Science, March, 1966.

Englinton, Geoffrey and Melvin Calvin. "Chemical Fossils." Scientific American, January, 1967.

Fowler, William A. "The Origin of the Elements." Scientific American, September, 1956. Offprint #210.

Graves, William P. "On a Peaceful Good Friday, Alaskans Feel the Dread Earthquake." National Geographic, July, 1964.

Heezen, Bruce C. "The Origin of Submarine Canyons." Scientific American, August, 1956. Offprint #807.

Judson, Sheldon and Dale F. Ritter. "Rates of Regional Denudation in United States." Journal of Geophysical Research, August 15, 1964.

Kulp, J. Laurence. "Geologic Time Scale." Science, April 14, 1961.

Leopold, Luna B. and W. B. Langbein. "River Meanders." Scientific American, June, 1966. Offprint #869.

Matthews, Samuel W. "The Night the Mountains Moved." National Geographic, March, 1960.

Plass, Gilbert N. "Carbon Dioxide and Climate." Scientific American, July, 1959. Offprint #823.

Rucorn, S.K. "Corals as Paleontological Clocks." Scientific American, October, 1966.

Simpick, Fredrick. "Fountain of Fire in Hawaii." National Geographic, March, 1960.

Tuttle, O. Frank. "The Origin of Granite." Scientific American, April, 1955. Offprint #819.

Urey, Harold C. "The Origin of the Earth." Scientific American, October, 1952. Offprint #833.

Wilson J. Tuzo. "Continental Drift" Scientific American, April, 1963. Offprint #868.

Zeller, E. J. "Modern Methods for Measurement of Geologic Time. Mineral Information Service, California Division of Mines and Geology, January, 1965.

MAPS:

American Petroleum Institute, Education Department, 1271 Avenue of the Americans, New York, N.Y. 10020 (Free maps and pamphlets)

Geological Society of America, 419 W. 117th Street, New York, N.Y. (Write for information about wall charts of the physical features of the ocean basins.)

Geological Society of America, 231 East 46th St., New York, N.Y. 10017. (Map of the glacial deposits of North America - $2.00)

Louisiana Agricultural Extension Service, Louisiana State University, Baton Rouge. (Map of the General Soil Areas and Associated Soil Series Groups of Louisiana. (May, 1962).

Natural Color Shaded Relief Map of the United States. Jeppeson & Co., 1959. 40 3/4" x 26 1/4" ($2.50).

FILMS:**

Challenge of the Oceans. 27 minutes, color. McGraw-Hill Text-Films.

Earthquakes and Volcanoes. 18 minutes, color. Film Associates of California, 1957.

Fossils Are Interesting. 9 minutes, color. Film Associates of California, 1956.

Glacier National Park. 22 minutes, color. Modern Talking Pictures, 1958.

It's About Time. 50 minutes, color. Bell Telephone Company.

The Solar Family. 11 minutes, color. Encyclopedia Britannica Educ. Corp.

**AGI-EBEC=American Geological Institute--Encyclopedia Britannica Educational Corporation.

APPENDIX B

SELECTED CAREERS - RELATED RESOURCES

The following are located in many school libraries or counselor's offices:

Angel, Juvenal L., Modern Vocational Trends Reference Book. New York: Simon and Schuster, 1970

Hopke, William E., Careers and Occupations. Garden City, New York: Doubleday

SRA Occupational Briefs. U. S. Printing Office. Washington, D.C.

Dictionary of Occupational Titles, U. S. Printing Office, Washington, D.C.

Occupational Outlook Handbook, U. S. Printing Office, Washington, D.C.

Career Kits:
"Career Kit," Science Research Associates, Chicago, Illinois
"Careers," Largo, Florida 33540
"Chronicles, Guidance Publications," Moravia, New York 13118
"Career Monographs," Institute of Research, Chicago, Illinois
"Occupational Exploration Kit," Science Research Associates, Chicago, Illinois

Other references and career materials are:

Feingold, S. Norman, and Sol Swerdloff, Occupations and Careers. McGraw-Hill Book Company, Webster Division, #20358, 1969.

Holland, John L., The Psychology of Vocational Choice. Blaisdell, 1969.

Louisiana State Department of Education

Oklahoma State Department of Education, Career Exploration, 1970.

Pamphlets and Publications:

Bureau of Indian Affairs, United States Department of Interior, Washington, D.C.

"Higher Education Opportunities for American Indians" National Vocational Guidance Association, 1607 New Hampshire Avenue, Washington, D.C. 20009

"Publicity Handbook" Parker Publishing Co., Inc., West Nyask, New York 10994.

"The Guidance Clinic" Science Research Associates, Chicago, Illinois

"Exploring Your Personality"
"Directory of Vocational Training Sources"
"Guidance Activities for Teachers of English"
"Guidance Activities for Teachers of Foreign Languages"
"Guidance Activities for Teachers of Mathematics"
"Guidance Activities for Teachers of Science"
"Guidance Activities for Teachers of Social Studies"
"Job Family Series"
"Senior Series"
"Understanding Yourself"
United States Department of Commerce.
"Director of National Trade Association"

Forestry Technicians, Science Research Associates, 259 E. Erie Street, Chicago, Illinois - 35¢

How To Get Into Science and Engineering, Science Clubs of America, 1719 North Street, N. W., Washington, D.C.

Jobs in Outdoor Work, Science Research Associates, 259 E. Erie Street, Chicago, Illinois - $1.00

Microbiologists, Science Research Associates, 259 E. Erie Street, Chicago, Illinois 35¢

Books on Careers in Nursing, Committee on Careers, National League for Nursing, 10 Columbus Circle, New York - 5¢

Osteopathic Profession, American Osteopathic Association, 212 E. Ohio Street, Chicago Illinois

Physician, Carrers, P. O. Box 135, Largo, Florida - 25¢

A Career in Physiology - Your Challenge and Opportunity, American Physiological Society 9650 Wisconsin Avenue Washington, D.C. - Free

Science Futures for Girls, Women's Bureau, U. S. Department of Labor, Superintendent of Documents Washington, D.C. - 5¢

Soil Scientists, Science Research Associates, 259 E. Erie Street Chicago, Illinois - 35¢

Soil Conservationists, Chronicle Guidance Publications, Inc., Moravia, New York - 35¢

Encyclopedia Britannica
425 Michigan Avenue
Chicago, Illinois 60601
"Getting a Job"
"Choosing a Job"
"Applying for a Job"

Indiana University
Bloomington, Indiana
"Choosing Your Occupation"
"Personal Qualities for Job Success"

Jam Handy Organization
2821 East Grand Boulevard
Detroit, Michigan 48211
"How Can I Understand Others?"

King Screen Productions
320 Aurora Avenue, N.
Seattle, Washington 98109
"Career Awareness"

Listening Library
1 Park Avenue
Old Greenwich, Connecticut 06870
"Planning Beyond High School"

Singer Society for Visual Education, Inc.
1345 Diversey Parkway,
Chicago, Illinois 60614
"What Good Is School?"

Career information and materials may be obtained from the following:

Career Materials

American Association for Inhalation Therapy
3554 Ninth Street
Riverside, California 92501

American Dietetic Association
620 North Michigan Avenue
Chicago, Illinois 60611

American Hospital Association
840 North Lake Shore Drive
Chicago, Illinois 60611

American Medical Association
535 North Dearborn Street
Chicago, Illinois 60611

Association of American Medical Colleges
2530 Ridge Avenue
Evanston, Illinois 60201

Cosmetologists, National Hairdressers and Cosmetologist's Association
175 Fifth Avenue
New York, New York 10010

Department of Medicine and Surgery
Veterans Administration
Washington, D.C. 20420

National Association for Practical Nurses Education and Service, Inc.
535 Fifth Avenue
New York, New York 10017

National Federation of Licensed Practical Nurses, Inc.
250 West 57th Street
New York, New York 10019

National League for Nursing Committee on Careers
10 Columbus Circle
New York, New York 10019

The National Foundation Health
Scholarships
800 Second Avenue
New York, New York 10017

Free and inexpensive career information which can be ordered in single or multiple copies:

Agriculture Engineer Careers
P. O. Box 235, Largo,
Florida - 25¢

Agricultural Research Workers
Careers, P. O. Box 135, Largo,
Florida - 25¢

Agriculture, Walton, E. V. and
Gray, J. D. Bellman Publishing
Company, P. O. Box 172, Cambridge,
Massachusetts - $1.00

Agronomist, Chronicle Guidance
Publications, 1970, 4pp - 35¢

Agronomist, Utah Department of
Employment Security, 1970,
2pp - Free

Biochemist, Chronicle Guidance
Publications, Inc.,
Moravia, New York - 35¢

Biochemist - Careers,
P. O. Box 135,
Largo, Florida - 25¢ to students

Biophysics, Biophysical Society
Box 3054, University Station,
Columbus, Ohio - Free

Botanists, Science Research
Associates, 259 E. Erie Street
Chicago, Illinois - 35¢

Botanist - Splaver, Sarah
Personnel Services, Inc.,
P. O. Box 306
Joffrey, N.H. - 25¢ to students

Careers in Agronomy - Crop
Science and Soil Science,
American Society of
Agronomy, 1972, 12 pp.

Careers in Biochemistry,
American Society of Biological
Chemists, 9650 Wisconsin Avenue
Washington, D.C.

Careers in Biological Sciences,
American Institute of Biological
Science, 2000 P. Street, N.W.,
Washington, D.C.

Careers in Botany, Botanical
Society of America, Inc.,
Department of Botany,
University of Texas,
Austin, Texas - Single copy free

Careers in Conservation, Soil
Conservation Society of America
7515 N.E., Ankeny Road
Ankeny, Iowa - Free

Chemical Technician, Chronicle
Guidance Publications, Inc.,
Maravia, New York.

Chemical Technicians, Science
Research Associates, 259 E.
Erie Street, Chicago, Illinois - 35¢

Conservation Officer, The Guidance
Center, Ontario College of Education
University of Toronto, 371 Bloor
Street, W., Toronto, Ontario, Canada
20¢

Do You Want to be a Nurse?
Committee on Careers, National
League for Nursing, 10 Columbus
Circle, New York - 10¢

Economist, Chronicle Guidance
Publications, Inc., Moravia,
New York - 35¢

Educational Qualifications of
Sanitary Engineers Engaged in the
Field of Public Health, American
Public Health Association, 1790
Broadway, New York - Free

Forestry as a Career, Institute
for Research, 537 S. Dearborn Street,
Chicago, Illinois - $1.00

Forestry Technicians, Science Research Associates, 259 S. Erie Street, Chicago, Illinois - 35¢

How to Get Into Science and Engineering. Science Clubs of America, 1719 North Street, N.W., Washington, D.C.

Jobs in Outdoor Work, Science Research Associates, 259 E. Erie Street, Chicago, Illinois - $1.00

Microbiologists, Science Research Associates, 259 E. Erie Street, Chicago, Illinois 35¢

Books on Careers in Nursing, Committee on Careers, National League for Nursing, 10 Columbus Circle, New York - 5¢

Osteopathic Profession, American Osteopathic Association, 212 E. Ohio Street, Chicago, Illinois.

Physician Careers, P. O. Box 135, Largo, Florida - 25¢

A Career in Physiology - Your Challenge and Opportunity, American Physiological Society, 9650 Wisconsin Avenue, Washington, D.C. - Free

Science Futures for Girls, Women's Bureau, U. S. Department of Labor, Supt. of Documents, Washington, D.C. - 5¢

Soil Scientists, Science Research Associates, 259 E. Erie Street, Chicago, Illinois - 35¢

Soil Conservationists, Chronicle Guidance Publications, Inc. Moravia, New York - 35¢

A Soil Science Career for You in Soil Conservation Service, Miscellaneous Publication No. 716. Supt. of Documents, U. S. Dept. of Agriculture, Washington, D.C. - 5¢

The Work and Education of a Biochemist, College of Forestry, State University of New York, Syracuse, New York - Free

Training and Employment of Wildlife Biologists and Fishery Biologists, National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. Free

Wildlife Specialist Careers, P. O. Box 135, Largo, Fla. - 25¢

Zoologist, Chronicle Guidance Publications, Inc., Moravia, New York - 35¢

Career Education Films:

Associated Films 347 Madison Avenue, New York, N.Y. 10017. "The Big Question - Choosing Your Career"

Coronet Film Co., Coronet Bldg., Chicago, Illinois 60601.
"Understanding Your Emotions"
"Benefits of Looking Ahead"
"Choosing Your Occupations"
"Attitude and Occupation"
"Personal Qualities for Job Success"
"How to Investigate Vocations"

Encyclopedia Britannica, 425 Michigan Avenue, Chicago, Illinois 60601
"Getting a Job"
"Choosing a Job"
"Applying for a Job"

Indiana University, Bloomington, Indiana.
"Choosing Your Occupation"
"Personal Qualities for Job Success"

Jam Handy Organization, 2821 E. Grand Blvd., Detroit, Michigan 48211
"How Can I Understand Others?"

King Screen Productions, 320 Aurora Avenue, N. Seattle, Washington 98109
"Career Awareness"

Listening Library, 1 Park Avenue
Old Greenwich, Conn. 06870
"Planning Beyond High School"

Singer Society for Visual Ed.,
Inc., 1345 Diversey Parkway,
Chicago, Illinois 60614
"What Good is School?"

Filmstrips:

Essential Education, Box 968
Huntsville, Texas 77340
"How to Get a Job and Keep It"
"How to Make A Career Decision"

Guidance Associates, Pleasantville,
New York 10570
"Choosing A College Career" (Part I)
"Failure: A Step Towards Growth"
"Getting and Keeping Your First Job"
"How to Read a College Catalog" (Part I)
"I Wish I'd Known That Before I Went
to College" (Parts I & II)
"Preparing for the Jobs of the 70's"
"Preparing for the World of Work"
"Should You Go to College" (Part I)
"Somebody's Cheating"
"What You Should Know Before You Go
To Work"
"Your Job Interview"

Sterling Movies, U.S.A., Inc., New
York, New York 10023
"Tommy [illegible] at Careers: Chemistry"

William W. Matthews Co., Pittsburg,
Pennsylvania 15222
"The Challenge of Change"

Parker Publishing Co., Inc.
West, Nyack, New York 10994
"The Guidance Clinic"

Science Research Associates,
Chicago, Illinois
"Exploring Your Personality"
"Directory of Vocational Training
Sources"
"Guidance Activities for Teachers
of English"
"Guidance Activities for Teachers
Foreign Languages"
"Guidance Activities for Teachers
of Mathematics"
"Guidance Activities for Teachers
of Social Studies"
"Job Family Series"
"Senior Series"
"Understanding Yourself"

United States Department of Commerce
"Director of National Trade Asso-
ciation"

Tape Recordings and Records:

McGraw-Hill Book Co., 330 W. 42nd Street
New York, N.Y. 10036
"A Man's Work" (100 Different
Interviews)

University of Kansas Guidance
Bureau, Lawrence, Kansas
"Occupational Information Tape
Recordings"

Other Resources and Agencies:

Area Development Act Training
Program, U. S. Department of Labor

Armed Forces Handbook, U. S.
Department of Defense
Washington, D.C.

Bureau of Indian Affairs,
Department of Interior
Washington, D.C.

Chamber of Commerce Personnel

Consultative Center, Kellog
Center, University of Oklahoma,
Norman, Oklahoma

Dept. of Labor, Bureau of
Apprenticeship and Training

United States Department of Labor
Washington, D.C.

United States Govt. Printing
Office, Washington, D.C.

United States Office of Education
Dept. of Health, Ed., and Welfare

United States Supt. of Documents,
Govt. Printing Office
Washington, D.C.

Vocational Rehabilitation
Department of Public Welfare
State Capitol
Oklahoma City, Oklahoma

STATE ADOPTED TEXT BOOKS - EARTH SCIENCE - 1973

BELOW AVERAGE

Allyn and Bacon, Inc.
Thurber-Kilburn, EXPLORING EARTH SCIENCE, 1970
Guide
Record Book
Teacher's Edition

AVERAGE

American Book Company
Jacobson et al., INQUIRY INTO EARTH AND SPACE SCIENCE, 1969
Teacher's Edition
Individual Units - The following six units are contained in the above hardbound text:
The Solar System and Universe - Theories and Models in Science
The Earth and Its History - Field Research in Science
The Earth as a Planet - Measurements and Data in Science
The Earth and Its Surface - Field Research in Science
Weather and Climate - Systematic Observation and Classification
Exploring Space - Instrumentation in Science

Houghton Mifflin Company
Jackson et al., SPACESHIP EARTH: EARTH SCIENCE, 1973
Teacher's Edition

APPENDIX C

AVERAGE (continued)

Charles E. Merril Publishing Division of Bell and Howell Company
Bishop et al., FOCUS ON EARTH SCIENCE, 2nd Edition, 1972
Teacher's Edition
Earth and Space Science Skillcards

Rand McNally and Company
Abraham et al., INTERACTION OF EARTH AND TIME, 1972
Teacher's Edition
Student Combination Package

Webster Division - McGraw-Hill Book Company
Heller, CHALLENGES: EARTH SCIENCE, 1973
Teacher's Edition

ABOVE AVERAGE

Houghton Mifflin Company
American Geological Institute, INVESTIGATING THE EARTH, 1973
Guide